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tational, E is constant along the same stream line (fillet) defined by the equations

$$\frac{dx}{u} = \frac{dy}{v} = \frac{dz}{w},$$

where u , v , w , are the component velocities of the particle; 3d, when the motion is steady but rotational, E is also constant along the same vortex line, defined by the equations

$$\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{r},$$

where p , q , r are the component spins.

Then follow a proof of the théorem of Helmholtz, above cited, and of the theorem that in the case of a liquid filling a recipient the velocity components u , v , w are determinate if the spins p , q , r are known at any instant. Several very instructive special cases of vortex motion are also considered; and the chapter closes with an exposition of the problem of the motion of a solid in a liquid, application being made especially to the case of pulsating spheres studied by Bjerknes.

R. S. W.

The Elements of Vital Statistics. By ARTHUR NEWSHOLME, M. D. Third Edition. London, T. Swan Sonnenschein & Co., and New York, The Macmillan Company. 1899. Pp. xii + 353.

That a third edition of this book has been demanded within ten years of its first appearance is gratifying evidence of a growing public interest in Vital Statistics and an appreciation of sound and careful work. Vital Statistics, interpreting that phrase in a somewhat larger sense than is done by this writer, is probably the best avenue along which to approach the general field of statistics. It is the oldest, most developed and most systematized branch of the subject, and, if properly handled, can be made of great interest even to beginners. For these reasons I have long felt that the book of Dr. Newsholme was, perhaps, as good an introduction to statistics as anything in the English language. There is no American book to be compared with it, for the articles by Dr. J. S. Billings and Dr. Roger S. Tracy are buried in pages of other matter, one in a medical journal and the other in an encyclopædia, and neither vies in simplicity or fullness of treatment with the present work. This third edition is almost

a new book, embracing fewer tables, more graphic illustrations, more references to results obtained in foreign countries and many new subjects. From the American standpoint it may be criticised as confined somewhat too closely to topics which especially interest English sanitary and medical statisticians. But as England is *facile princeps* in this field and the United States as a whole is inferior, not merely to those countries of Europe with which we naturally compare ourselves, but even to Russia, Greece, Spain and the colonies of Australia, the objection is not a serious one. During years of critical use of Dr. Newsholme's book I have never found in it a serious error of statement and the argumentative parts are sound, temperate and convincing. It is a typically English book, caring little for theory or refinements of analysis unless they have a clear bearing on the results, but strong in all such practical discussions as statistical evidence for the utility of vaccination, causes of infant mortality, or the fallacies to which statistical arguments are exposed. WALTER F. WILLCOX.

CENSUS OFFICE.

BOOKS RECEIVED.

- Anatomie des Frosches.* A. ECKERT and R. WIEDERSHEIM. Revision by DR. ERNEST GAUPP. 2d Edition. Braunschweig, Friedrich Vieweg und Sohn. 1899. 2d Part. Pp. 237-548 + xii.
- Praxis und Theorie der Zellen- und Befruchtungslehre.* VALENTIN HÄCKER. Jena, Gustav Fischer. 1899. Pp. viii + 260. Mark 7.
- Fixirung, Färbung und Bau des Protoplasmas.* ALFRED FISCHER. Jena, Gustav Fischer. 1899. Pp. x + 362. Mark 11.
- Folk-lore in Borneo.* WILLIAM HENRY FURNESS. Wallingford, Pa., Privately Printed. 1899. Pp. 30.
- Sewage Analysis.* J. ALFRED WANKLYN and WILLIAM JOHN COOPER. London, Kegan, Paul, Trench, Treübner & Co., Ltd.; Philadelphia, J. B. Lippincott Company. 1899. Pp. xvi + 220. \$2.00.
- New Plane and Solid Geometry.* WOOSTER WOODRUFF BEMAN and DAVID EUGENE SMITH. Boston, Ginn & Company. 1899. Pp. ix + 382.

SOCIETIES AND ACADEMIES.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE—PRELIMINARY PROGRAMS.

SECTION A, MATHEMATICS AND ASTRONOMY.

'REPORT on Progress in Non-Euclidean Geometry,' George Bruce Halsted, University of Texas, Austin, Texas.

'Report on recent progress in the theory of linear groups,' L. E. Dickson, University of California, Berkeley, Cal.

'Recent advances in the application of mathematics to physical problems,' A. S. Hathaway, Rose Polytechnic Institute, Terre Haute, Ind.

'Recent progress in theoretical meteorology,' Cleveland Abbe, Weather Bureau, Washington, D. C.

'Recent progress in positional astronomy,' J. R. Eastman, Andover, N. H.

'Practical astronomy during the first half of the present century,' T. H. Safford, Williamstown, Mass.

'Internal forces that generate stellar atmospheres,' J. Woodbridge Davis, New York City.

'The determination of the nature of electricity and magnetism, including a determination of the density of the ether,' R. A. Fessenenden, Western University, Allegheny, Pa.

'Ancient eclipses and chronology,' R. W. McFarland, Oxford, Ohio.

'Some points in the design of a spectroscope,' H. C. Lord, Ohio State University, Columbus.

'The relation between point and vector analysis,' J. V. Collins, Stevens Point, Wis.

'William Hamilton, Hermann Grassmann und deren Widersacher,' Ferdinand Kraft, Zurich.

'The theory of mathematical inference,' G. J. Stokes, Queen's College, Cork, Ireland.

'The magnetic work of the Coast and Geodetic Survey,' L. A. Bauer, Coast and Geodetic Survey, Washington, D. C.

SECTION G, BOTANY.

Vice-Presidential Address, Charles R. Barnes.

'Division of the megaspore of *Erythronium*,' John H. Schaffner.

'The embryo-sac of *Leucocrinum montanum*,' Francis Ramaley.

'The occurrence of Lignum and Calcium Oxalate during differentiation of the buds of *Prunus americana*,' H. C. Bolley.

'The flora of Franklin County, Ohio,' A. D. Selby.

'Studies of the vegetation of the high plains of western Nebraska,' C. E. Bessey.

'The geotropism of the Hypocotyl of *Cucurbita*,' Edwin Bingham Copeland.

'Notos on the long-leaved (*Longifoliae*) Willows,' W. W. Rowlee.

Sullivant Day—Papers on bryological subjects, especially relating to the work of Sullivant and the progress in bryology since his time. Exhibition of his type specimens, collections, publications, portraits and other mementos.

'On the occurrence of the black rot of cabbage in Europe,' H. A. Harding.

'Duration of bacterial existence under trial environments,' H. C. Bolley.

'Cultures of *Uredineae* in 1899,' J. C. Arthur.

'Field experiments with 'Nitragin' and other germ fertilizers,' Byron D. Halsted.

'Some notes on subterranean organs,' A. S. Hitchcock.

'The Tamarack Swamps in Ohio,' A. D. Selby.

'Some monstrosities in spikelets of *Eragrostis* and *Setaria* with their meaning,' W. J. Beal.

'Botanical Teaching in the Secondary Schools,' W. C. Stevens, Ida Clendenin.

'Suggestions looking toward a more rational basis for the classification of the *Pleurocarpus* Mosses,' A. J. Grout.

'Basis for generic and specific characters in the *Uredineae*,' J. C. Arthur.

'Two diseases of *Juniperus* caused by *Trametes pini* and *Polyporus carneus*,' Herman Von Schrenk.

'The effect of hydrocyanic acid gas upon the germination of seeds,' C. O. Townsend.

'Physiological effect of hydrocyanic acid gas upon young fruit trees,' W. G. Johnson.

'Are the trees advancing or retreating upon the Nebraska plains?' C. E. Bessey.

'Etiolative Reactions,' Wm. B. Stuart.

'The Mycorrhiza of *Tipularia*,' Julia B. Clifford.

'Cytological studies in the *Hepaticae*,' Bradley M. Davis.

'A thousand miles for a fern,' C. E. Bessey.

'The distribution of lichens in the Mississippi Valley,' B. E. Fink.

DISCUSSION AND CORRESPONDENCE.

THE FOEHN WINDS OF SWITZERLAND.

MR. WARD's review, in *SCIENCE* of July 21st, of Billwiller's classification of the *Foehn* winds